



FEMA Requirement B1: Hazard Identification

Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction?

Local Mitigation Plan Review Guide, FEMA, 2011, page 19

This “Good Practice” document is intended to help plan developers understand the FEMA requirement to describing the type, location, and extent of all natural hazards that can affect a jurisdiction. This can be a confusing requirement without benefit of clear explanations and examples. Fortunately, even minor adjustments in approach can make all the difference in developing a meaningful plan.

Common Reasons Why FEMA Returns Plans for B1 Revisions

1. All hazards are not described which are commonly recognized to affect the jurisdiction/planning area – or a rationale is not explained for omitting a natural hazard. A description/definition is not given for each type of natural hazard.

Tip: To assist in identifying hazards, start by consulting the state hazard mitigation plan. Also consider whether there are any hazards unique to your community that are not discussed in the state plan.

Tip: Avoid misidentifying a human-caused vulnerability as a natural hazard (e.g., power outages) rather than as an impact resulting from vulnerabilities related to a natural hazard such as severe winds. While FEMA recognizes that communities may want to also profile technological or social/terrorism hazards caused by human actions or other non-natural causes, be clear about which are impacts falling under the natural hazard category.

Tip: Emphasize the relationship between human-caused vulnerabilities and natural hazards while describing impacts (see Requirement B3). Add impact subsections for interruption of electrical and utility service, dam failure, infrastructure failure, etc., under hazards such as extreme weather and flooding.

2. A multi-jurisdictional plan does not identify hazards in a community(s) that are unique or varied from the overall planning area.
3. A description of the extent of each hazard was not included within the plan. Many plans confuse the meaning of “extent,” addressed in Requirement B1, with “impacts,” addressed in Requirements B2 and B3.

Tip: For hazards that are not associated with comparative scientific scales, meet this requirement by providing a statement focusing on event characteristics not impacts. The content should be similar to “there is no scale associated with this hazard; however, given previous occurrences and/or characteristics available for this geographic area, the strength and/or magnitude of this hazard for our community would be expected as___”.

Tip: Another way to classify hazard extent is to use terms such as high, medium and low, providing the plan clearly defines any classification used to illustrate extent. Again, focus on event characteristics rather than its impacts.

For instance, “high” could refer to:

- the highest winds, water depth, or wind speed experienced by the community
- the value on an established scientific scale or measurement system, such as EF2 on the Enhanced Fujita Scale for tornadoes or 5.5 on the Richter Scale for Earthquakes the speed of onset or duration of events.

Tip: See Attachment A: *Extent Measurement Scales by Natural Hazard* for a list of scales (and source websites) for measuring magnitude for the most common natural hazards affecting New England.

4. The best, most current data is not included for the planning area. For instance if local information is unavailable, no substitute data is provided such as for the region.

**Know the Difference:
“Extent” and “Impact”**

- ❖ **Extent** means the strength or magnitude of the hazard. For example, extent could be described in terms of the specific measurement of an occurrence on a scientific scale (for example, Enhanced Fujita Scale, Saffir - Simpson Hurricane Wind Scale, Richter Scale, flood depth grids) and/or other quantitative hazard factors, such as duration and speed of onset.
- ❖ **Impact** is the effect of the hazard on the community and its assets. The community determines its valued assets, e.g., populations, structures, facilities, cultural resources, capabilities, and/or activities.

Tip: For sources of data see Attachment B: FEMA Region 1 Mitigation Planning Webliography. Use a combination of different data sources to develop the best possible risk assessment.

Plans Demonstrating Good Practice for Requirement B1

Two abstracts are provided below. Each demonstrates a different component of the requirement. Most jurisdictions meet Requirement B1 within their risk assessment through these approaches.

Example 1 explains the rationale for omitting known hazards, addressing both extent and location for each type. Example 2 describes extent and location in the hazard profiles for natural hazards deemed most significant by the community.

Each abstract is preceded by a brief explanation why these plan sections meet the requirements. In addition, practices going “Beyond Minimum Requirements” are noted. Many other approaches are possible, so don’t be limited by these examples; the approach taken should fit the particular circumstances of the community.

Two useful resources follow the examples: a table of “extent” measurement sources by natural hazard and a webliography of other related links.

Example 1: *Multi-jurisdiction Hazard Mitigation Plan Update 2015*

Descriptions for Location and Extent

Why This Plan Demonstrates Good Practice

1. The Plan identifies all the hazards commonly known to affect the planning area. Plan developers began by reviewing the jurisdictions’ prior plan and most recent state hazard mitigation plan to develop a list. They clearly explained why certain natural hazards in those plans are most significant, warranting further analysis in the current update because of location, extent, and potential impacts.
2. The plan update provides a rationale for why two hazards from the State’s most recent hazard mitigation plan update were omitted from the multi-jurisdictional update.
3. **Beyond Minimum Requirements:** The example identifies three additional hazards that were not included in the prior plan or in this update. The plan explains that these may be included in the future as climatic conditions change and pose a more significant threat.
4. The plan update identifies a hazard unique to one of the communities.

5. The example briefly describes each type of natural hazard.

Beyond Minimum Requirements: Failure or overload in utilities related to flooding is cited as a vulnerability rather than a human-caused hazard. **Note:** Citing power failure and other situations as human-caused hazards differentiated from natural-caused hazards is also acceptable when the triggers related to human causes are clearly explained (e.g., technological failure or terrorism).

6. The example uses the term “extent” correctly as a measure of magnitude.

See Abstract on following pages.

Example 1

Multi-jurisdiction Hazard Mitigation Plan Update 2015

2.4 Natural Hazards

Plan developers began the process by examining the prior regional plan and most recent state hazard mitigation plan to identify all the natural hazards that can affect participating jurisdictions. While a broad number of natural hazards exist that can impact the region at any time and to varying extents, the communities identified eight natural hazards deemed to pose a significant threat to the region, and one, additional hazard that uniquely affects the Town of Jonesville. They identified the following hazards for detailed profiling and analysis:

- **Flooding-** Flooding in the planning area can be the result of rising water levels in a watercourse, the inability of soils to absorb water, surface runoff, failure or overload in utilities, blockages like ice jams and beaver dams, or dam or blockage failures. Flooding is unique because portions of each town are at-risk; however, in this region only a small portion of the land in each town is subject to significant risk. Flooding is possible throughout the year. The most severe flood of record occurred in 1938, after nine days of rain coupled with heavy snow. The total precipitation during this period was 22 inches, and Jonesville experienced flood depths of up to 8 feet.
- **Wind-** Wind can occur at all times and in all areas of the planning region, with gusts clocking 60 mph or more during the strongest storms. Wind can cause damage by itself, but is often associated with other weather events, e.g., hurricanes.
- **Thunderstorms-** Thunderstorms typically feature rain, high winds, and lightning. A number of other hazards are associated with thunderstorms, which can occur throughout the planning area at all times of the year. “Severe” thunderstorms (i.e., National Weather Service defines as winds 58 mph or greater and/or hail 1.00 inch in diameter or greater) are most common in the summer months.
- **Winter Storms/Nor’easters-** Winter storms and Nor’easters most commonly occur throughout the region in the winter months, but they are not uncommon in the spring and autumn months. Winter storms and nor’easters typically bring snowfall and wind, as well as extreme cold, but can be responsible for a wide range of precipitation. The region has received over 20 inches of snow in single storms.
- **Tropical Cyclones-** Hurricanes, tropical storms, and tropical depressions are large, destructive, cyclonic storms from tropical regions. The entire region is at-risk to hurricanes and tropical storms. These storms typically occur between late spring and late fall. The storm of record was a Category 3 hurricane as measured on the Saffir-Simpson scale, with wind speeds measured up to 120 miles per hour.

Continued on next page...

Example 1

Multi-jurisdiction Hazard Mitigation Plan Update 2015

Continued:

- **Drought-** Drought is the result of long-term deficits in precipitation for the region. A drought affects the entire region and can occur at any time of the year; it is important because many households and farms are supplied by private wells of only moderate yield. The region's climate has produced only "minor" droughts as measured on the Palmer Drought Severity Index but this could change with erratic weather.
- **Hail-** Hail is large, falling pieces of ice, commonly associated with thunderstorms. Hail can cause widespread property and crop damage across much of the region. The entire region is vulnerable to hail, which is most likely to occur in the summer months. Hail the size of ping pong balls (1.5 inch diameter) has been recorded in the planning area.
- **Erosion-** Erosion is the removal of soil and rock, usually by water or wind flow. Fluvial erosion—erosion caused by rivers and streams—is a specific concern to parkland and a road in the town of Jonesville along the banks of the Bog River which is eroding at a rate of 0.5 feet per year. Elsewhere in the region, erosion poses little hazardous threat.

Hazards that were not included in The 2015 Plan, but were included in the 2014 State Natural Hazards Mitigation Plan Update, are:

- **Sea Level Rise-** Sea level rise affects coastal communities, only. This region is not a coastal region.
- **Wildfire-** Wildfires are large, destructive fires that spread quickly over woodland or brush. They are rare in the northeastern part of the state, due to forest type and climate. The largest one in the past 50 years occurred in Jonesville; it burned only 7 acres. However, future plans may be expanded to include wildfires if they become a larger concern, due to climate change.

Additional hazards that were not included in The 2015 Plan, but may become a larger concern in the future, and may be considered in future plans, are:

- **El Niño/La Niña-** This climatological phenomenon (oscillating climate patterns governed by ocean temperature) affects other natural hazards addressed in The 2015 Plan. Future plans may be expanded to specifically address El Niño/La Niña.
- **Global Warming/Climate Change-** Like El Niño/La Niña, this hazard affects other natural hazards addressed in the plan. Global warming/climate change will be considered when planning and implementing mitigation actions. Future plans may be expanded to specifically address global warming/climate change.

Extreme Temperatures - Temperatures in the northeastern part of the state very rarely reach 100°F or fall below 0°F. However, future planning may be expanded to include extreme heat or cold if conditions are exacerbated by climate change.

Example 2: *Town of Meredith, NH, Hazard Mitigation Plan Update 2015*

Description for Type, Location and Extent

Why This Plan Demonstrates Good Practice

1. The plan describes the type, location, and extent of each hazard.
2. The plan reports if every part of town is vulnerable to a hazard, but also describes the specific portion of the community most vulnerable. It corroborates this finding with factual information: a graphic showing the extent of a significant earthquake that affected the state in 2012, including Meredith.
3. The plan correctly uses the term “extent” as a measure of magnitude without confusing it with the term “impact.” In fact, the table included shows the Richter scale, which makes clear the relationship between magnitude (extent) and effects (impacts).

See Abstract on following page.

Abstract from pages 14 - 15

Town of Meredith, NH Hazard Mitigation Plan Update 2015**EARTHQUAKE**

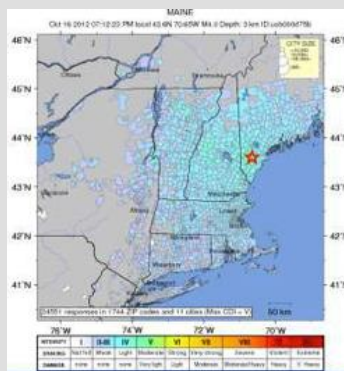
Location: An earthquake could affect all areas of Meredith, though the Village area with its multi-story (and in some cases masonry buildings) is at greater risk. One of two major faults in New Hampshire runs through neighboring Sanbornton.

Extent: An earthquake is a series of vibrations induced in the Earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating. Earthquakes are commonly measured using *magnitude*, or the amount of seismic energy released at the epicenter of the earthquake. The Richter magnitude scale is a mathematical device used to compare the size of earthquakes, shown in Table 9.¹

Table 9: Richter Magnitude Scale

Magnitude	Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph.
2.5 to 5.4	Often felt, but only causes minor damage.
5.5 to 6.0	Slight damage to buildings and other structures.
6.1 to 6.9	May cause a lot of damage in very populated areas.
7.0 to 7.9	Major earthquake. Serious damage.
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.

New Hampshire is considered to be in an area of moderate seismic activity with respect to other regions of the country. This means the state could experience large (6.5-7.0 magnitude) earthquakes, but they are not likely to occur as frequently as in a high hazard area like the Pacific coast. There is the potential for nearby earthquakes to register 5.5 on the Richter Scale, causing slight damage to buildings and structures. Due to the unique geology of New Hampshire, earthquake propagation waves travel up to 40 times further than they do in the western United States, possibly enlarging the area of damage.⁹ The strongest earthquakes to strike New Hampshire occurred December 20 and 24, 1940 in the town of Ossipee. Both earthquakes had a magnitude of 5.5 and were felt over an area of 400,000 square miles. Damage to structures included collapsed chimneys, cracked walls, and broken pipes. Evidence of ground cracks in the region was also noted. Similarly, the Sanbornton – Gaza Corners earthquake in 1982 (4.5 magnitude) affected a broad area and caused a waterline to fracture in Concord.



B1 Regulatory Guidance

Abstracts from *Code of Federal Regulations and Local Mitigation Plan Review Guide, October 1, 2011*

Element B1 Regulation [§201.6(c) (2) (i)] and [§201.6(c) (2) (iii)] (page 18)

The risk assessment shall include a] description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events. For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Element Intent (page 19)

To understand the potential and chronic hazards affecting the planning area in order to identify which hazard risks are most significant and which jurisdictions or locations are most adversely affected.

Element Requirements (page 19-20)

1. The plan **must** include a description of the natural hazards that can affect the jurisdiction(s) in the planning area.

A natural hazard is a source of harm or difficulty created by a meteorological, environmental, or geological event. The plan **must** address natural hazards. Manmade or human - caused hazards may be included in the document, but these are not required and will not be reviewed to meet the requirements for natural hazards. In addition, FEMA will not require the removal of this extra information prior to plan approval.

2. The plan **must** provide the rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area.
3. The description, or profile, **must** include information on location, extent, previous occurrences, and future probability for each hazard. Previous occurrences and future probability are addressed in sub - element B2.

The information does not necessarily need to be described or presented separately for location, extent, previous occurrences, and future probability. For example, for some hazards, one map with explanatory text could provide information on location, extent, and future probability.

Location means the geographic areas in the planning area that are affected by the hazard. For many hazards, maps are the best way to illustrate location. However, location may be described in other formats. For example, if a geographically - specific location cannot be identified for a hazard, such as tornados, the plan may state that the entire planning area is equally at risk to that hazard.

Continued...

Abstracts from *Code of Federal Regulations and Local Mitigation Plan Review Guide, October 1, 2011*

Continued:

Extent means the strength or magnitude of the hazard. For example, extent could be described in terms of the specific measurement of an occurrence on a scientific scale (for example, Enhanced Fujita Scale, Saffir - Simpson Hurricane Scale, Richter Scale, flood depth grids) and/or other hazard factors, such as duration and speed of onset. Extent is not the same as impacts, which are described in sub - element B3.

4. For participating jurisdictions in a multi-jurisdictional plan, the plan **must** describe any hazards that are unique and/or varied from those affecting the overall planning area.

Check Out These Additional Aids

Local Mitigation Plan Review Guide, October 2011

<http://www.fema.gov/media-library/assets/documents/23194>

Local Mitigation Planning Handbook, March 2013 (pages 5-2 through 5-3)

<http://www.fema.gov/media-library/assets/documents/31598>

Attachment A: EXTENT MEASUREMENT SCALES BY NATURAL HAZARD

Note: Web addresses change over time. Sources are current as of 03/11/2016.

NATURAL HAZARD	MEASURES OF EXTENT
Avalanche	North American Public Avalanche Danger Scale http://www.avalanche.org/danger_card.php
Coastal Erosion	Cubic yards of sand; meters/feet of coast lost
Dam Failure	Generally described by potential area of inundation. Hazard Potential Rating: Low, Significant or High. Federal Guidelines for Dam Safety, FEMA, April 2004 (pages 5-6) https://www.fema.gov/media-library/assets/documents/3909 See also National Inventory of Dams (NID) http://nid.usace.army.mil/cm_apex/f?p=838:12 Notes: State inventories may be useful; including for adjacent states within a jurisdiction's watershed. Small dams may not be present in national or state inventories.
Drought	Palmer Drought Severity Index https://www.drought.gov/drought/content/products-current-drought-and-monitoring-drought-indicators/palmer-drought-severity-index U.S. Drought Monitor https://www.drought.gov/drought/content/products-current-drought-and-monitoring-drought-indicators/us-drought-monitor Keetch-Byram Drought Index (KBDI) – developed to assess fire risk https://www.drought.gov/drought/content/products-current-drought-and-monitoring-wildfire/keetch-byram-drought-index
Earthquake	Moment Magnitude Scale http://earthquake.usgs.gov/learn/topics/measure.php Richter Scale (less accurate, no longer commonly used for scientific purposes) http://earthquake.usgs.gov/learn/glossary/?term=Richter scale Peak Ground Acceleration http://earthquake.usgs.gov/hazards/about/technical.php [Note: Distinguish magnitude from intensity] http://earthquake.usgs.gov/learn/topics/mag_vs_int.php Modified Mercalli Scale of Earthquake Intensity http://earthquake.usgs.gov/learn/topics/mercalli.php
Flood	Flood Depth; crest height, XX ft. over flood stage, recurrence interval; XX ft. wall of water. Acreage inundated. Historical, USGS http://waterdata.usgs.gov/nwis/sw Terminology http://aprfc.arh.noaa.gov/resources/docs/floodterms.php FEMA Flood Map Service Center https://msc.fema.gov/portal Sea Level Rise and Nuisance Flood Frequency Changes in US, NOAA, 2014 http://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_073.pdf See state, regional, and local historical records along with related studies

NATURAL HAZARD	MEASURES OF EXTENT
Fluvial Erosion	<p>Fluvial Erosion Hazard (FEH) corridor is a function of the meander belt width, which varies with valley shape, surficial geology (e.g. bedrock, glacial lake sand), and the natural channel length, slope, and width, including both the channel and adjacent land.</p> <p>VT: The FEH risk in Vermont has 6 ratings; Very Low, Low, Moderate, High, Very High, and Extreme.</p> <p>http://www.watershedmanagement.vt.gov/rivers/docs/rv_NFIPFEHFactSheet.pdf</p> <p>http://watershedmanagement.vt.gov/rivers/docs/rv_municipalguide.pdf</p> <p>NH:</p> <p>http://des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-10.pdf</p>
Hailstorm	<p>National Weather Service Hail Size Estimation Chart</p> <p>http://www.weather.gov/btv/skywarn_hailwind</p>
Hurricane	<p>Saffir-Simpson Hurricane Wind Scale</p> <p>http://www.nhc.noaa.gov/aboutsshws.php</p>
Ice Storm	<p>Generally described by accumulation thickness, temperature, wind, duration. May reference historical occurrences.</p> <p>Ice Storm Accumulation – query National Weather Service for historical data http://www.weather.gov/</p> <p>Ice Storm definition (greater than ¼ inch):</p> <p>http://w1.weather.gov/glossary/index.php?word=ice+storm</p> <p>Sperry-Piltz Ice Accumulation Index (SPIA Index, copyrighted); SPIA incorporates forecast ice accumulation, winds and temperatures; categories 0-5.</p> <p>http://www.spia-index.com</p> <p>Note: the 1998 ice storm in New England was likely a category 5.</p>
Landslide	<p>An estimate of a past or possible event: Cubic yards of earth moved (could be millions); size of surface area (sq. ft/meters, acres); area shifted/how far it shifted – e.g. “landslide could be 1000 yards of hillside moving 200 feet”. Speed of onset.</p>
Lightning	<p>Lightning strikes per square mile/kilometer per year</p> <p>Map example:</p> <p>http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf</p> <p>Lightning website:</p> <p>http://www.lightningsafety.noaa.gov/science.shtml</p> <p>State averages: http://www.lightningsafety.noaa.gov/stats/05-14_Flash_Density_State.pdf</p>
Nor'easter	<p>Generally described by meteorological conditions – wind, temperature, precipitation, duration.</p> <p>Note: The Northeast Snowfall Impact Scale (NESIS) is based on impact factors including population, and is not strictly a measure of extent.</p> <p>https://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis</p>

NATURAL HAZARD	MEASURES OF EXTENT
Rip Current	The number of warnings issued a year could be the extent. Similarly, the number of rip currents related to drowning or ocean rescues due to rip currents would be another way to measure the scale of this hazard. [Since there isn't a standard scale or static features, this is a tricky hazard occurrence. However, the National Weather Service (NWS) does offer predictions and warnings when there is a possibility of rip currents. The NWS classifies them as 'low risk', 'moderate risk' and 'high risk'. For example, if a nor'easter was approaching, a rip current warning might be issued. http://www.ripcurrents.noaa.gov/forecasts.shtml .)
Sea Level Rise	Amount and rate of sea level rise, millimeters per year http://climate.nasa.gov/vital-signs/sea-level/ NOAA Sea Level Rise Viewer https://coast.noaa.gov/digitalcoast/tools/slr Sea Level Rise and Nuisance Flood Frequency Changes around the US, NOAA, 2014 http://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_073.pdf
Severe Winter Storm	Generally described by meteorological conditions – inches/meters of snow, ice, or freezing rain; duration of event; and/or wind speed and temperature. See also Wind Chill, Nor'easter, and Ice Storm.
Storm Surge	Change in water level due to the presence of a storm, over and above predicted astronomical tide. Peak wave heights and winds. SLOSH maps predict potential flooding from storm surge. Overview: http://www.nws.noaa.gov/om/hurricane/resources/surge_intro.pdf SLOSH http://www.nhc.noaa.gov/surge/slosh.php [NOAA Storm Surge Inundation web maps (SLOSH Maximum of Maximums) by Hurricane category – educational http://noaa.maps.arcgis.com/home/item.html?id=b1a20ab5eec149058bafc059635a82ee]
Thunderstorm	NOAA classifies types of thunderstorms as single-cell, multi-cell, squall line, supercell, vortex, mesoscale convective system, mesoscale convective complex, mesoscale convective vortex, and derecho. Any of these can be severe, defined by wind speeds of 58 MPH or greater and/or hail 1.0 inches or greater in diameter. http://www.nssl.noaa.gov/education/svrwx101/thunderstorms/types/
Tornado	Enhanced Fujita Tornado Scale (EF Scale) http://www.spc.noaa.gov/faq/tornado/ef-scale.html & http://www.spc.noaa.gov/efscale/ [Fujita-Pearson Tornado Scale (superseded by EF Scale, see above) http://tornado-facts.com/the-tornado-scale/]
Tsunami	Wave “run up” height at the shore and how far inland water could reach.
Wind Chill	NWS Windchill Temperature (WCT) index addresses winter winds and freezing temperatures. http://www.nws.noaa.gov/om/winter/windchill.shtml
Wildfire	Reference a local historical event or estimate of future occurrence for area burned: number of acres


NATURAL HAZARD	MEASURES OF EXTENT
	Related information, <i>fire potential</i> Keetch-Byram Drought Index (KBDI) https://www.drought.gov/drought/content/products-current-drought-and-monitoring-wildfire/keetch-byram-drought-index
Windstorm	Beaufort Wind Scale http://www.spc.noaa.gov/faq/tornado/beaufort.html

Attachment B: FEMA R1 Mitigation Planning Webliography

Note: Web addresses change over time. Sources are current as of 03/11/2016.

Hazard Mitigation is sustained action taken to reduce or eliminate risk to people and their property from natural hazards over the longest possible term.

REGULATORY INFORMATION

	Final Rule 44 CFR 201.6 http://www.fema.gov/pdf/help/fr02-4321.pdf
Disaster Mitigation Act of 2000 (DMA 2K)	http://www.fema.gov/library/viewRecord.do?id=1935

DISASTERS AND NATURAL HAZARDS INFORMATION

FEMA-How to deal with specific hazards

<http://www.ready.gov/natural-disasters>

Natural Hazards Center at the University of Colorado

<http://www.colorado.edu/hazards>

National Oceanic and Atmospheric Administration (NOAA)

Provides information on various projects and research the agency is engaged in. Good source for information on climate and weather.

<http://www.noaa.gov>

National Climatic Data Center *active archive of weather data.*

<http://lwf.ncdc.noaa.gov/oa/ncdc.html>

2011, *The Northeast Snowfall Impact Scale (NESIS)*

<http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis>

Blizzard of 2015 in historical context

<https://www.ncdc.noaa.gov/news/putting-blizzard-2015-historical-context>

FLOOD RELATED HAZARDS**FEMA Coastal Flood Hazard Analysis & Mapping**

<http://www.fema.gov/coastal-flood-hazard-analysis-and-mapping>

Floodsmart

<http://www.floodsmart.gov/floodsmart/>

Top Picks for Tools, NOAA DigitalCoast, Office for Coastal Management

<https://coast.noaa.gov/digitalcoast/tools/list>

National Flood Insurance Program (NFIP)

<http://www.fema.gov/nfip>

Digital quality Level 3 Flood Maps

<https://msc.fema.gov/portal>

Flood Map Modernization

<http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping>

Reducing Damage from Localized Flooding: A Guide for Communities, 2005 FEMA 511

<http://www.fema.gov/library/viewRecord.do?id=1448>

WIND-RELATED HAZARDS**ASCE Wind Speed Maps**

<http://windspeed.atcouncil.org>

U.S. Wind Zone Maps

https://www.fema.gov/media-library-data/20130726-1501-20490-5921/fema_p85_apndx_g.pdf

Tornadoes

<http://www.ncdc.noaa.gov/sotc/tornadoes/201601>

National Hurricane Center

<http://www.nhc.noaa.gov>

How to Prepare for a Hurricane

https://www.fema.gov/media-library-data/1409003345844-0e142725ea3984938c8c6748dd1598cb/How_To_Prepare_Guide_Hurricane.pdf

National Severe Storms Laboratory, 2009, "Tornado Basics",

<http://www.nssl.noaa.gov/education/svrwx101/tornadoes/>

FIRE RELATED HAZARDS**Firewise**

<http://www.firewise.org>

NOAA Fire/Smoke/Hot Spot Satellite Imagery

July 11, 2016

FEMA Region 1, Boston, MA

<http://www.ospo.noaa.gov/Products/land/fire.html>

U.S. Forest Service, USDA

<http://www.fs.fed.us/>

USGS Topographic Maps

[https://store.usgs.gov/b2c_usgs/b2c/start/\(xcm=r3standardpitrex_prd\)/.do](https://store.usgs.gov/b2c_usgs/b2c/start/(xcm=r3standardpitrex_prd)/.do)

Wildfire Hazards - A National Threat

<http://pubs.usgs.gov/fs/2006/3015/2006-3015.pdf>

GEOLOGIC RELATED HAZARDS

HAZUS

<https://www.fema.gov/hazus> & <http://www.hazus.org>

Building Seismic Safety Council

<https://www.nibs.org/bssc>

Earthquake hazard history by state

<http://earthquake.usgs.gov/earthquakes/states/>

GIS data available on earthquakes

<http://earthquake.usgs.gov/data/>; <http://earthquake.usgs.gov/data/products/>

USGS Earthquake homepage

<http://earthquake.usgs.gov/earthquakes>

USGS National Landslide Hazards Map

<http://landslides.usgs.gov/hazards/nationalmap/>

Kafka, Alan L. 2008. *Why Does the Earth Quake in New England?* Boston College, Weston Observatory, Department of Geology and Geophysics

http://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html

Map and Geographic Information Center, 2010, "Connecticut GIS Data", University of Connecticut, Storrs, Connecticut

http://magic.lib.uconn.edu/connecticut_data.html

2012 Maine earthquake

http://www.huffingtonpost.com/2012/10/17/maine-earthquake-2012-new-england_n_1972555.html

DETERMINING RISK AND VULNERABILITY

Community Vulnerability Assessment Tool Methodology: Published study with instructions on how to complete a local risk and vulnerability assessment

<https://coast.noaa.gov/data/docs/digitalcoast/cvat-nhr.pdf>

GENERAL PLANNING WEBSITES

American Planning Association

July 11, 2016

FEMA Region 1, Boston, MA

<http://www.planning.org>

PlannersWeb - Provides city and regional planning resources

<http://www.plannersweb.com>

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND MAPPING

USGS National Hazards

http://www.usgs.gov/natural_hazards/

The National Spatial Data Infrastructure & Clearinghouse (NSDI) and Federal Geographic Data Committee (FGDC) Source for information on producing and sharing geographic data

<http://www.fgdc.gov>

The Open Geospatial Consortium Industry source for developing standards and specifications for GIS data

<http://www.opengis.org>

Northeast States Emergency Consortium (NESEC): Provides information on various hazards, funding resources, and other information

<http://nesec.org/>

DATA GATHERING

USACE Hydrologic Engineering Center (HEC), an organization within the Institute for Water Resources, is the designated Center of Expertise for the US Army Corps of Engineers

<http://www.hec.usace.army.mil/>

HEC software

National Water & Climate Center

<http://www.wcc.nrcs.usda.gov/>

WinTR-55 Watershed Hydrology

<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?&cid=stelprdb1042901>

Stormwater Manager's Resource Center SMRC

<http://www.stormwatercenter.net>

USGS Water Data for the Nation

<http://waterdata.usgs.gov/nwis/>

Topography Maps and Aerial photos

<http://www.terraserver.com/view.asp?tid=142>

National Register of Historic Places

<http://www.nps.gov/nr/about.htm>

National Wetlands Inventory

<http://www.fws.gov/wetlands/>

FEMA RESOURCES

Federal Emergency Management Agency (FEMA) Region 1

www.fema.gov

National Mitigation Framework

<http://www.fema.gov/national-mitigation-framework>

Federal Insurance and Mitigation Administration (FIMA)

<http://www.fema.gov/fima>

Community Rating System (CRS)

<https://www.fema.gov/national-flood-insurance-program-community-rating-system>

FEMA Building Science

<http://www.fema.gov/building-science>

National Flood Insurance Program (NFIP)

<http://www.fema.gov/national-flood-insurance-program>

Floodplain Management Branch

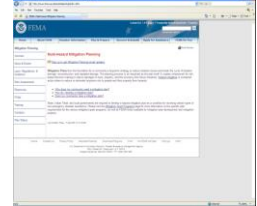

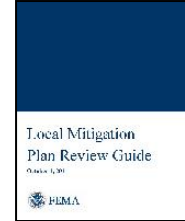
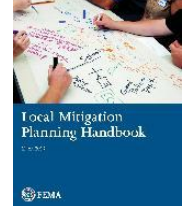

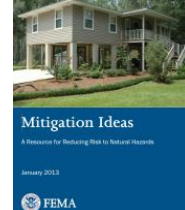

<http://www.fema.gov/floodplain-management>

Increased Cost of Compliance (ICC): ICC coverage allows homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of \$30,000.

<http://www.fema.gov/national-flood-insurance-program-2/increased-cost-compliance-coverage>

National Disaster Recovery Framework

<http://www.fema.gov/national-disaster-recovery-framework>

	<p>FEMA Multi-Hazard Mitigation Planning Website http://www.fema.gov/multi-hazard-mitigation-planning</p>
	<p>FEMA Hazard Mitigation Planning Resources https://www.fema.gov/hazard-mitigation-planning-resources</p>
	<p>Local Mitigation Plan Review Guide http://www.fema.gov/library/viewRecord.do?id=4859</p>
	<p>Local Mitigation Planning Handbook complements and liberally references the Local Mitigation Plan Review Guide above http://www.fema.gov/library/viewRecord.do?id=7209</p>
	<p>HAZUS http://www.fema.gov/protecting-our-communities/hazus</p>
	<p>Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards http://www.fema.gov/library/viewRecord.do?id=6938</p>
	<p>Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials http://www.fema.gov/media-library/assets/documents/31372</p>
	<p>IS-318 Mitigation Planning for Local and Tribal Communities Independent Study Course - http://training.fema.gov/EMIWeb/IS/is318.asp</p>

OTHER FEDERAL RESOURCES

U.S. Army Corps of Engineers: Provides funding for floodplain management planning and technical assistance and other water resources issues.

www.nae.usace.army.mil

Natural Resources Conservation Service: Technical assistance to individual land owners, groups of landowners, communities, and soil and water conservation districts.

www.nrcs.usda.gov

Rural Economic and Community Development: Technical assistance to rural areas and smaller communities in rural areas on financing public works projects.

www.rurdev.usda.gov

Farm Service Agency: Manages the Wetlands Reserve Program (useful in open space or acquisition projects by purchasing easements on wetlands properties) and farmland set aside programs

www.fsa.usda.gov

National Weather Service: Prepares and issues flood, severe weather and coastal storm warnings. Staff hydrologists can work with communities on flood warning issues; can give technical assistance in preparing flood-warning plans.

www.weather.gov

Economic Development Administration (EDA): Assists communities with technical assistance for economic development planning

<https://www.eda.gov/>

National Park Service: Technical assistance with open space preservation planning; can help facilitate meetings and identify non-structural options for floodplain redevelopment.

www.nps.gov

US Fish & Wildlife Service: Can provide technical and financial assistance to restore wetlands and riparian habitats.

www.fws.gov

Department of Housing & Urban Development

www.hud.gov

Small Business Administration: SBA can provide additional low-interest funds (up to 20% above what an eligible applicant would qualify for) to install mitigation measures. They can also loan the cost of bringing a damaged property up to state or local code requirements.

www.sba.gov/disaster

Environmental Protection Agency www.epa.gov

SUSTAINABILITY/ADAPTATION/CLIMATE CHANGE**U.S. EPA**<http://www.epa.gov/climatechange/>**NOAA National Ocean Service (NOS)**<http://oceanservice.noaa.gov/>**National Fish, Wildlife and Plants Climate Adaptation Strategy**www.wildlifeadaptationstrategy.gov**ICLEI Local Governments for Sustainability**<http://www.icleiusa.org/>**Kresge Foundation Survey**<http://www.kresge.org/news/survey-finds-communities-northeast-are-trying-plan-for-changes-climate-need-help-0>**New England's Sustainable Knowledge Corridor**<http://www.sustainableknowledgecorridor.org/site/>**The Strategic Foresight Initiative (SFI)**http://www.fema.gov/pdf/about/programs/oppa/findings_051111.pdf**OTHER RESOURCES**

New England States Emergency Consortium (NESEC): NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Brochures and videotapes are available on earthquake preparedness, mitigation, and hurricane safety.

www.nesec.org

The Association of State Floodplain Managers (ASFPM): ASFPM has developed a series of technical and topical research papers, and a series of Proceedings from their annual conferences.

www.floods.org

National Voluntary Organizations Active in Disaster (VOAD) is a non-profit, nonpartisan membership organization that serves as the forum where organizations share knowledge and resources throughout the disaster cycle—preparation, response, recovery and mitigation.

<http://www.nvoad.org/>

REGION I MITIGATION PLANNING CONTACTS

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